



CORRELATION BETWEEN DEPRESSION AND VITAMIN D LEVEL: A CASE CONTROL STUDY

Ishdutt Pandey*

Junior Resident-3rd year Department of Psychiatry, Moti Lal Nehru Medical College Prayagraj. *Corresponding Author

V. K. Singh

Professor department of psychiatry, Moti Lal Nehru Medical College, Prayagraj.

Anurag Varma

Consultant, Department of psychiatry, Moti Lal Nehru Medical College, Prayagraj.

ABSTRACT Vitamin D deficiency is directly related to major clinical condition i.e rickets in children, increase risk of cardiovascular disease and bacterial infections. Action of vitamin D on major depressive disorder (MDD) still not known i.e how vitamin D related to depression. The aim of study to assess and compare vitamin D levels in patients of MDD and healthy individuals, and also compare symptom profile of patients with MDD with and without vitamin D deficiency. This study includes 120 patients with MDD and 120 normal healthy control with age and gender matched. Vitamin D deficiency was found significantly among cases than controls. In symptom profile lack of interest and hypochondriasis were found in vitamin D deficiency patients.

KEYWORDS : Vitamin D, MDD

INTRODUCTION

Major Depressive Disorder is common and disabling mental illness, worldwide across all ages, genders and races. In 2021, 3.8% of world population was suffering from Major Depression Disorder(1). More women are affected by Major Depression Disorder than men. Cognitive symptoms particularly suicidal thoughts, punishment feeling, self-criticism, worthlessness and somatic affective symptoms such as difficulty in concentration, tiredness, indecisiveness, irritability, crying and loss of energy were significantly higher among vitamin D depleted patients(2). Ultraviolet-B radiation's exposure to skin forms pre-vitamin D3, the skin precursor 7-dehydrocholesterol that is present in all layers of human skin, typically in the epidermis(3). Currently, there are at least three lines of evidence to support the association of Vitamin D with Major Depressive Disorder: first, an increased region-specific expression of vitamin D receptors (VDRs) in brain areas (such as prefrontal and cingulate cortices) known to play a key role in mood regulation(4). second, the modulatory role proposed for vitamin D in the association between depression and inflammation(5) (through a possible immune-modulatory mechanism)(6), last, the emerging insights about the neuroprotective properties of vitamin D (by virtue of its anti-inflammatory effects(7))(8). The particular biological machineries linking vitamin D and depression are not completely understood. However, possible pathways include an imbalance in the calcium homeostasis of intracellular and extracellular compartments and a possible fallout of imbalance between glutamate, an excitatory neurotransmitter, and GABA, an inhibitory neurotransmitter. In our knowledge, so far in India, very few studies had examined the correlation between Major Depressive disorder and serum vitamin D level(9). Therefore, we planned to assess the association of vitamin D levels with depression in this part of country. We will be investigating the association between Vitamin D level and different symptom profile of Major Depressive.

METHODOLOGY

Method of data collection-

A case control study conducted in psychiatry department of Swaroop Rani Hospital, MLN Medical college of Prayagraj, tertiary care Centre in North India, after taking approval from the ethics committee [Registration No. ECR/922/inst/up/RR-22 issued under new drug and clinical trial Rules 2019]. Patients were recruited in this study through psychiatry OPD, over a period of one year from June 2023 to June 2024. We included 120 patients with MDD and 120 normal healthy individuals with age and sex matched, divided into three subgroups as per age (A- 20 to 30 years, B- 30 to 45 years, C- 45 to 60 years). Equal number of Individuals will be selected in both case and controls subgroups. Socio-demographic profile and clinical assessment will be done through semi-structured proforma designed for this study. MINI will be applied as screening tool and diagnosis will be made as per DSM-5 criteria. Severity of Major Depressive Disorder will be assessed through HAM-D-17. The patients whose age between 20 to 60 years and qualified the diagnosis of MDD on Diagnostic and Statistical Manual of Mental Disorder-5 Criteria were assessed and included in this study. Patients in this study who has received psychotropic medication, vitamin D and dietary supplement within last 3 months,

Pregnant, lactating females and female using medicinal contraceptive method, substance use disorder (except nicotine), Not willing to give informed consent and uncooperative for assessment, any psychiatric illness other than Major Depressive Disorder, Known Medical or surgical illness which can potentially cause vitamin D deficiency, were excluded. Same study criteria applied for both case and control.

Statistical Analysis-

All the data recorded during observation were kept systemically in SPSS (version 23) and excel data sheet (MS excel 2010). Qualitative data were analyzed by applying Chi-square test with post hoc table (adjusted p-value) whenever applicable and quantitative data with unpaired t-test using statistical package SPSS. All the statistical test were performed with 95% confidence i.e. probability level 0.05.

OBSERVATIONAL AND RESULT-

Table 1- Demographic Profile Of The Study Participants

Variable		Case (%)	Control (%)	p-value	Statistical significance
Gender	M	53 (44.16)	60 (50.00)	0.365	Statistically not significant
	F	67 (55.84)	60 (50.00)		
Mean (SD) age in years		37.6412.23	38.3911.58	0.626	Statistically not significant
Marital	M	82 (68.00)	91 (76.00)	0.294	Statistically not significant
	UM	28 (23.00)	24 (20.00)		
	D	10 (9.00)	05 (04.00)		
Locality	U	50 (41.70)	60 (50.00)	0.195	Statistically not significant
	R	70 (58.30)	60 (50.00)		
Use of tobacco	Yes	45 (37.50)	43 (35.80)	0.788	Statistically not significant
	No	75 (62.50)	77 (64.20)		
Religion	H	105 (87.50)	108 (90.00)	0.540	Statistically not significant
	M	15 (12.50)	12 (10.00)		

Table 2- Sex Wise Difference In Vitamin D Level In Case And Control Groups

Sex	Vitamin D level (ng/ml)		p- value	Statistical significance
	Case mean	Control mean SD		
Male	19.25 13.15	30.0015.40	<0.0001	Statistical significance
Female	18.90 13.30	30.7515.50	<0.0001	Statistical significance
Case	19.0513.22		<0.0001	Statistical significance
Control	30.35			

Table 3- Vitamin D Level In Case And Control Group As Per Age Groups.

Age groups (in years)	Mean vitamin D level (ng/ml) case	Mean vitamin D level (ng/ml) Control	p-value	Statistical significance
20-30	17.6608.53	31.6517.89	<0.0001	Statistical significance
30-45	20.2715.29	29.4415.13	0.008	Statistical significance
45-60	19.2114.93	29.9813.27	0.001	Statistical significance

Table 4- Range of Vitamin D In Case And Control Groups.

Range of vitamin D (ng/ml)	Case No %	Control No %	p- value	Statistical significance
Severe (<10)	28 (23.30)	01 (00.80)	<0.0001	Statistical significance
Moderate (10-20)	48 (40.00)	23 (19.00)	0.003	Statistical significance
Mild (20-30)	29 (24.20)	49 (41.00)	0.046	Statistical significance
Normal (>30)	15 (12.50)	47 (39.20)	<0.0001	Statistical significance

RESULT-

A total of 695 (patients+ healthy individual) were screened in the OPD Department of psychiatry, SRN Hospital Prayagraj, out of these, 455 (patients+ healthy individual) were excluded. The remaining 240 patients were included in the study, in which 120 patients having MDD and 120 healthy individuals as a control. Study tools were applied to the case.

In table 2 mean vitamin D level was significantly less in males of case than in control groups. Similarly, the difference was significant in females of case and control. Mean vitamin D level was 19.0513.22 (ng/ml) in case group and 30.35 15.44 (ng/ml) in control group. Therefore, the difference between mean vitamin D level in individuals of case and control group was significant. In table 3 In the case group mean vitamin D level (20.27 15.29 ng/ml) in individuals of 30-45 years age was maximum group followed by (19.21±14.93 ng/ml) in 45-60 years age group and (17.66±08.53 ng/ml) in 20-30 years age group. Similarly in control group average mean vitamin D level of 45-60 years age group was maximum, (29.98±13.27 ng/ml) followed by in 30-45 years age group (29.44±15.13 ng/ml) and 20-30 years age group (31.65±17.89 ng/ml). Therefore, differences in mean vitamin D level at each age groups (20-30years, 30-45 years and 45-60 years) between case and control group were significant (<0.05). In table 4 the difference in proportions of individuals under various vitamin D level range in both case and control group was statistically significant (p<0.0001).

DISCUSSION-

In our study there were 53 (44.16%) males and 67 (55.84%) females in the case group. Depression was slightly more prevalent in females (55.4%) than in males (44.6%)(10) (1). The number and percentage of married, unmarried and divorced individuals were 82 (68.00%), 28 (23.00%) and 10 (09.00%) in the case group and 91 (76.00%), 24 (20.00%) and 05 (04.00%) in control group respectively. The majority of the depressed persons (84.30%) were married(10). Indian socio-cultural scenario, disruption of family support, and struggle for livelihood are perhaps more prominent and important in the life of married persons. This may be the reason for more cases of depression in married persons we met in the present study.

In the present study, depressed patients mainly belong to Hindu family. Depressed persons (79.80%) belonged to Hindu religion(10). Contrary to this, the majority of depressed cases (56.00%) who attended the study were Muslim in a study conducted in Lucknow, U.P(2). We observed a similar proportion of depressed persons belonging to urban areas is less than rural areas. The proportion of urban, semi-urban and rural depressed persons in case and control groups were 34%, 14%, 52%, 29.3%, 12% and 58.7%, respectively(2). Contrary to these, found that depression is more common in urban backgrounds(11).

In the present study, the mean vitamin D level in individuals of the case group (19.05±13.22 ng /ml) was significantly (P <0.0001) lower than individuals of control (30.35±15.44 ng/ml) group. The mean vitamin D level was 34.65 ng /mL in males and 61.45 ng/mL in female control

of normal group. The mean vitamin D level was 24.17 ng/mL and 23.36ng/mL in males and females of the case groups(12). Mean vitamin D level was significantly (p=0.0001) less in males of the case (19.25±13.15ng/ml) than in the control (30.00±15.40ng/ml) group. Similarly, the difference was significant (p <0.0001) in females of case (18.90±13.30ng/ml) and control (30.75±15.50ng/ml) groups. The proportion of patients with symptoms of depressed mood, feelings of 81 guilts, suicide, insomnia (initial, middle, delayed), retardation, agitation, anxiety (psychic and somatic), gastrointestinal symptoms, Somatic symptoms (general& gastrointestinal) genital symptoms, weight loss and insight were similar (p>0.05) in cases whether serum vitamin D level was <30ng/ml or >30ng/ml. However, significantly more cases in the ≥30ng/ml group than in the <30ng/ml group showed work and interest and less hypochondriasis.

CONCLUSION-

We observed that Females are more prone to depression than males. Depression is more pronounced in elderly population (>30 years). Married individuals are more susceptible to depression. Depression is more common in unemployed persons than in employed. Individuals of rural background may be more depressed. Majority of depressed individuals do not use tobacco use. Serum vitamin D concentration was lower in depressed persons than normal individuals.

Financial Support And Sponsorship-

Nil

Conflict Of Interest-

There are no conflicts of interest.

REFERENCES-

- Menon V, Kar SK, Suthar N, Nebhinani N. Vitamin D and Depression: A Critical Appraisal of the Evidence and Future Directions. *Indian Journal of Psychological Medicine.* 2020 Jan;42(1):11–21.
- Sharma N, Bharti S, Jilani AQ, Agarwal A, Singh S, Sharma R. Clinical correlation of vitamin D in depression. *Int J Adv Med.* 2019 Jul 24;6(4):1008.
- Silva MRM. Relationship between vitamin D deficiency and psychophysiological variables: a systematic review of the literature. *Vitamin D.* article 14.pdf.
- Van Etten E, Stoffels K, Gysemans C, Mathieu C, Overbergh L. Regulation of vitamin D homeostasis: implications for the immune system: *Nutrition Reviews*©, Vol. 66, No. s2. *Nutrition Reviews.* 2008 Sep 25;66:S125–34.
- Mora JR, Iwata M, von Andrian UH. Vitamin effects on the immune system: vitamins A and D take centre stage. *Nat Rev Immunol.* 2008 Sep;8(9):685–98.
- Buell JS, Dawson-Hughes B. Vitamin D and neurocognitive dysfunction: Preventing "D" ecline? *Molecular Aspects of Medicine.* 2008 Dec;29(6):415–22.
- Song C, Wang H. Cytokines mediated inflammation and decreased neurogenesis in animal models of depression. *Progress in Neuro-Psychopharmacology and Biological Psychiatry.* 2011 Apr;35(3):760–8.
- Berridge MJ. Vitamin D and Depression: Cellular and Regulatory Mechanisms. *Barker EL, editor. Pharmacol Rev.* 2017 Apr;69(2):80–92.
- Grover S, Dalla E, Mehra A, Chakrabarti S, Avasthi A. Physical Comorbidity and its Impact on Symptom Profile of Depression among Elderly Patients Attending Psychiatry Services of a Tertiary Care Hospital. *Indian Journal of Psychological Medicine.* 2017 Jul;39(4):450–6.
- Reddy MV, Chanorashekhar CR. PREVALENCE OF MENTAL AND BEHAVIOURAL DISORDERS IN INDIA : A META-ANALYSIS.
- Khan AH, Iqbal R, Naureen G, Dar FJ, Ahmed FN. Prevalence of vitamin D deficiency and its correlates: results of a community-based study conducted in Karachi, Pakistan. *Arch Osteoporos.* 2012 Dec;7(1–2):275–82.